WHAT IS CLAIMED IS:

1. A substrate with a transparent conductive oxide film, comprising a substrate and a transparent conductive oxide film provided on the substrate and constituted by a plurality of ridges and a plurality of flat portions, wherein the surfaces of the ridges and the flat portions have many continuous micron-size protrusions.

2. The substrate with a transparent conductive oxide film according to Claim 1, wherein the protrusions have basal plane diameters of from 0.1 to 0.3 μm and height/basal plane diameter ratios of from 0.7 to 1.2.

3. A substrate with a transparent conductive oxide film, comprising a substrate and a transparent conductive oxide film provided on the substrate, wherein the substrate with the transparent conductive oxide film, has a haze of from 10 to 95% over a full wavelength region of from 400 to 800 nm, and the difference of the absolute values between the maximum value and the minimum value of the haze (the maximum value - the minimum value) is not more than 50%.

4. The substrate with a transparent conductive oxide film according to Claim 3, wherein the substrate with the transparent conductive oxide film, has a haze of from 40 to 70% (as an average of from 400 to 600 nm) in a wavelength region of from 400 to 600 nm and a haze of from 20 to 40% (as an average of from 600 to 800 nm) in a wavelength region of from 600 to 800 nm.

5. A substrate with a transparent conductive oxide film, comprising a substrate and a transparent conductive oxide film provided on the substrate, wherein the transparent conductive oxide film comprises discontinuous small ridges made of a first oxide and a continuous layer made of a second oxide, formed on the small ridges, wherein the surface of the continuous layer has many continuous micron-size protrusions.

6. The substrate with a transparent conductive oxide film according to Claim 1, wherein the substrate with the transparent conductive oxide film, has a sheet resistance of from 8 to 20 Ω/□ and an optical transmittance of from 80 to 90% at 550 nm measured by an immersion liquid method.

7. The substrate with a transparent conductive oxide film according to Claim 5, wherein the small ridges have basal plane diameters of from 0.2 to 2.0 µm.

8. The substrate with a transparent conductive oxide film according to Claim 5, wherein the first oxide is composed of SnO_2 or SnO_3 containing fluorine, the fluorine content being not more than 0.01 mol% based on SnO_2.

9. The substrate with a transparent conductive oxide film according to Claim 5, wherein the second oxide is a transparent conductive oxide containing at least one member selected from the group consisting of SnO_2, ZnO and In_2O_3.

10. The substrate with a transparent conductive oxide film according to Claim 5, wherein the second oxide is SnO_2 containing fluorine-doped tin as the main component, contains fluorine in an amount of from 0.01 to 4 mol% based on SnO_2 and has a conductive electron density of from 5×10^{19} to 4×10^{20} cm^{-3}.

11. The substrate with a transparent conductive oxide film according to Claim 5, wherein a film made of an oxide different in the composition from the first and second oxides, is formed between the discontinuous small ridges made of the first oxide and the continuous layer made of the second oxide.

12. The substrate with a transparent conductive oxide film according to Claim 11, wherein the first oxide is SnO_2, the different oxide is SiO_2, and the second oxide is fluorine-doped SnO_2.

13. The substrate with a transparent conductive oxide film according to Claim 1, wherein the substrate with the transparent conductive oxide film, has a haze of from 10 to 95% over a full wavelength region of from 400 to 800 nm.

14. A process for producing the substrate with the transparent conductive oxide film as defined in Claim 1, which comprises forming, on a transparent substrate, discontinuous small ridges made of a first oxide by an atmospheric pressure CVD method, and forming thereon a continuous layer made of a second oxide.

15. The process for producing the substrate with the transparent conductive oxide film according to Claim 14, wherein the small ridges are formed by an atmospheric pressure CVD method employing tin tetrachloride, water and hydrogen chloride.

16. The process for producing the substrate with the transparent conductive oxide film according to Claim 14, wherein the continuous layer made of the second oxide is formed on the discontinuous small ridges made of the first oxide, by an atmospheric pressure CVD method.

17. The process for producing the substrate with the transparent conductive oxide film according to Claim 16, wherein a film made of an oxide different in the composition from the first and second oxides, is formed between the discontinuous small ridges made of the first oxide and the continuous layer made of the second oxide, by an atmospheric pressure CVD method.

18. A photoelectric conversion element having a rear face electrode, via a photoelectric conversion layer, on the substrate with the transparent conductive oxide film as defined in any one of Claims 1 to 13.

19. The photoelectric conversion element according to Claim 18, wherein the photoelectric conversion layer is a layer having p-, i- and n-type-layers formed in this order.

20. The photoelectric conversion element according to Claim 18, wherein the rear face electrode is a metal film

containing Ag in an amount of at least 95 mol% in the film.

21. The photoelectric conversion element according to Claim 20, wherein the metal film contains Pd or Au in an amount of from 0.3 to 5 mol% in the film.

22. The photoelectric conversion element according to Claim 18, which has a contact-improving layer between the rear face electrode and the n-type-layer nearest to the rear face electrode, between the photoelectric conversion layer and the rear face electrode.

23. The photoelectric conversion element according to Claim 22, wherein the contact-improving layer has a resistivity of not more than 1×10^{-2} $\Omega\cdot$cm.

24. The photoelectric conversion element according to Claim 22, wherein the contact-improving layer has an absorption coefficient of not more than 5×10^{3} cm^{-1} in a wavelength region of from 500 to 800 nm.

25. The photoelectric conversion element according to Claim 22, wherein the contact-improving layer contains zinc oxide (ZnO) as the main component, and at least 90 atomic % of the total metal component in the layer is Zn.

26. The photoelectric conversion element according to Claim 25, wherein the layer containing ZnO as the main component, contains Ga or Al in an amount of from 0.3 to 10 mol% based on the summation with Zn.